

SECTION 8.3

Volume II

~~PRESTRESSED CONCRETE~~ **PRESTRESSED CONCRETE** PRODUCERS

QUALITY CONTROL RELATED TO MAJOR PRODUCT DEFECTS

8.3.1. PURPOSE

The purpose of this procedure is to establish a standard method for evaluating the effectiveness of ~~P~~restressed ~~C~~oncrete ~~P~~roducer (~~Plant~~) quality control (~~QC~~) ~~efforts-processes~~ for minimizing the incidence of major defects in prestressed concrete products. This evaluation process requires monitoring the rate of major production defects that occur in prestressed concrete products; using these rates as a basis for evaluating the effectiveness of ~~prestressed concrete producer~~ ~~the Plant's QC~~ quality control efforts; and taking action that will improve ~~prestressed concrete producer~~ ~~the Plant's QC~~ quality control efforts when they are below ~~a~~ ~~the~~ satisfactory level ~~of performance~~.

8.3.2. AUTHORITY

~~Code of Federal Regulations (CFR), Federal Aid Policy Guide (FAPG), Subchapter C – Engineering and Traffic Operations, Part 637 – Construction Inspection and Approval, Subpart B – Quality Assurance Procedures for Construction Sections~~

334.044(2), 334.044(10)(a), and 334.048 Florida Statutes

8.3.3. REFERENCES

Florida Department of Transportation Standard Specifications for Road and Bridge Construction Section 450 Precast Prestressed Concrete Construction

Code of Federal Regulations (CFR), Federal Aid Policy Guide (FAPG), Subchapter G – Engineering and Traffic Operations, Part 637 – Construction Inspection and Approval, Subpart B – Quality Assurance Procedures for Construction Sections

8.3.4. SCOPE

This procedure is used by the ~~Prestressed Concrete Structures Plants~~ (~~Plants~~) to monitor and ensure that the defect rate of products produced do not exceed

Commented [FT1]: Only a Vol. 1 has existed for years, yet it serves as a Vol.2 (linked from Section 105). I would like to break these out into two documents to mitigate the confusion.

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the established limits. Primary offices that are affected by this procedure include the District Materials ~~and Research~~ Offices ~~(DMRO)~~, State Materials Office ~~(SMO)~~, District Construction Offices ~~(DCO)~~, State Construction Office ~~(SCO)~~, State Structures Design Office ~~(SDO)~~ and District ~~SDO Structures Design Offices~~.

8.3.5. GENERAL INFORMATION

Major defects may occur in prestressed concrete products during the production process. ~~These defects are usually correctable and proper correction results in the Department can's acceptance of the product;~~ however, the Department does not consider the quality of a corrected product to be as good as the quality of a product that needs no correction. ~~Since the Department seeks to place products with the very best quality into service whenever possible, the number of corrected or defective products must be kept to a minimum. In order to~~ To encourage ~~prestressed concrete producers~~ Plants to establish and maintain efforts that minimize defects, the Department compiles defect rates on a semiannual basis for each prestressed concrete product group at each Plant and these rates are used as the basis for establishing a defect rate limit. ~~A defect rate limit is the defect rate that a producer Plant must stay below in order to~~ to achieve the level of product quality that is acceptable to the Department.

8.3.6. MONITORING MAJOR DEFECTS

8.3.6.1. Plant and DMRO Responsibilities ~~District Materials Offices~~

Plants are required to submit to the ~~District Materials Office~~ DMRO, the semiannual compilation of the major deficiency data for each category and group of products. Ensure that the Plant's ~~QC quality control~~ plan addresses this requirement, as described in **Specifications Section 450**. ~~Each District Materials Office~~ DMRO will verify and compile the submitted defect rate data for Plants which they are responsible for verification inspection and testing. The compiled data must be summarized as shown on the attached sample spreadsheet referred to as a Prestressed Concrete Product Defect Data Table ~~(Table 8-3-1)~~, every 6 months, referred to as the monitoring periods, which are from January 1st ~~to~~ to June 30th and from July 1st to December 31st ~~of each year~~.

If the ~~producer Plant is of the opinion that~~ believes a major defect is caused by a design error and not a ~~Plant producer~~ error, the Project Administrator (PA) and the ~~person in charge of prestressed concrete for the District Materials Office~~ DMRO prestressed concrete personnel must determine whether ~~or not~~ they agree with the ~~Plant Producer~~. ~~If they disagree with the producer Plant, and the Plant producer is unwilling to accept the decision, it can may be~~ appealed to the District Construction Engineer (DCE) and

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District Materials and Research Engineer (DMRE) who should consult with the District ~~Structures Design Office~~SDO and/or State ~~Structures Design Office~~SDO before making a final decision. -Until a final decision is made by the Department about the defect in question, it will not be reported in the ***Prestressed Concrete Product Defect Data Table***.

If the ~~District Materials Office~~DMRO representative determines that a defect is major and the ~~Plant producer~~ disagrees, then the determination may be appealed to the ~~District Construction Engineer~~DCE and ~~District Materials and Research Engineer~~DMRE for final determination. Until a final determination is made by the Department about the defect in question, it will not be reported in the ***Prestressed Concrete Product Defect Data Table***.

~~The table shows that p~~Prestressed concrete products are organized by product groups that have similar casting, stressing and handling characteristics in the ***Prestressed Concrete Product Defect Data Table*** ~~and~~; therefore, have defect rates and a defect limit that are also characteristic of the group.

The information gathered for 6 months for each product group includes the following:

- (1) Total number of products produced;
- (2) Number of major defects, by defect type, in the products produced;
- (3) Total number of major defects, which is the summation of all major defect types in (2) and
- (4) The defect rate, which is computed by dividing the value in (3) above (total number of major defects) by the value in (1) above (total number of products produced). -For example: if 100 products are produced and these have a total number of major defects of 20 then the defect rate is computed by dividing 20 by 100 which results in 1/5 or 0.20 defects per product produced.

Within 14 days after each 6-month data gathering period expires, the ~~District Materials Office~~DMRO must electronically forward the ***Prestressed Concrete Product Defect Data Table*** for each Plant in the district to the ~~State Materials Office~~SMO. Only major defects, as defined in ***Specification Section 450*** are to be entered into the ***Prestressed Concrete Product Defect Data Table*** with the following qualifications:

- (1) Do not include the bottom flange spalls of the skewed beams which are caused by the effects of beam camber.

- (2) ~~If a~~ **Do not include** defects ~~is~~ caused by the degree of skew ~~and if~~ the skew angle (the angle between the longitudinal axis and the skewed end face of the beam) is less than the following limit, ~~the defect must not be entered into the~~ **Prestressed Concrete Product Defect Data Table**:
- a. Type II, III and IV AASHTO Beams – 55 degrees
 - b. Type V and VI AASHTO Beams – 65 degrees
 - c. **Florida-I Beams and** Bulb-T Beams – 70 degrees

~~When an individual component (beam, pile or slab) has multiple defects of the same type, they must be considered as one defect for the purpose of reporting in the~~ **Prestressed Concrete Product Defect Data Table**. ~~For example: if an individual pile has 3 spalls, 1 chip and 2 cracks, these must be reported in the~~ **Prestressed Concrete Product Defect Data Table** as 1 spall, 1 chip and 1 crack.

- (3) ~~Do not include u~~Uncorrected major defects that are revealed during inspection after delivery to the project site, ~~must not be reported in the~~ **Prestressed Concrete Product Defect Data Table**. ~~The PA but~~ must be reported ~~the defect~~ to the ~~person in charge of DMROM~~ prestressed concrete ~~personnel for the District Materials Office~~ **DMRO** who ~~should address this oversight by~~ will evaluate ~~whether or not~~ ~~whether~~ the ~~producer~~ **Plant** is in compliance with the ~~quality control~~ **QC** plan. ~~If the producer Plant is not in compliance with the quality control QC plan, appropriate action must will be taken by the person in charge of prestressed concrete for the District Materials Office~~ **DMRO prestressed concrete personnel**.

- (4) ~~Do not include a~~ **A** major defect that is caused by a design error, as determined by the Department and not by ~~producer~~ **Plant** error, ~~must will not be reported in the~~ **Prestressed Concrete Product Defect Data Table**. ~~The PA should report to the District SDO and/or State SDO but should will be reported by the Project Administrator to the District Structures Design Office and/or State Structures Design Office.~~

- ~~(4)~~(5) When an individual component (beam, pile or slab) has multiple defects of the same type, they must be considered as one defect for reporting in the **Prestressed Concrete Product Defect Data Table**. For example: if an individual pile has 3 spalls, 1 chip and 2 cracks, these must be reported in the **Prestressed Concrete Product Defect Data Table** as 1 spall, 1 chip and 1 crack.

Commented [FT2]: Florida I-Beams (FIBs) have been in production for ~10 years, so this needs to be updated to reflect reality. I consulted with State Structures Design, and they confirmed that FIBs should be in the less than 70 degree skew category.

8.3.6.2. ~~State Materials Office~~ SMO Responsibilities

Upon the receipt of the data in accordance with 8.3.6.1, from each ~~District~~ DMRO, the ~~State Materials Office~~ SMO enters the statewide defect data into an electronic version of the Prestressed Concrete Product Defect Data Summary Table (Table 8-3-2) and forwards it to the ~~District Materials Office~~ DMRO for actions as specified in 8.3.8. -This information will be used by the ~~State Materials Office~~ SMO to establish and modify the defect rate ~~limit for~~ limit for each product group.

8.3.7. DEFECT RATE LIMITS

The following are the established defect rate limit for each category of products:

(A) Piles: 5 percent

(B) Slabs: 5 percent

(C) Beams: 15 percent

The Plant's ~~quality control~~ QC plan shall include a statement to address the ~~above defect rate limits~~ requirements and the Plant's efforts to maintain the defect rate of the products below the ~~established~~ limit.

8.3.8. ACTIONS RELATED TO THE DEFECT RATE LIMIT

During ~~the monthly quality control and quality assurance personnel~~ meetings with the Plant and DMRO prestressed concrete personnel, the Plant's ~~quality control~~ QC Manager shall discuss the current defect rates of the manufactured products. The discussion shall include the Plant's action or ~~quality control~~ QC plan modification regarding the defect rates reduction, especially for the products ~~that their~~ which defect rates are approaching ~~to~~ their limits before the end of the semiannual monitoring period.

When a ~~prestressed concrete Producer~~ Plant exceeds the established defect rate limit, the ~~District Materials Office~~ DMRO must take action to encourage the ~~prestressed concrete producer~~ Plant to improve ~~quality control~~ QC procedures. If procedures are not improved; the ~~District Materials Office~~ DMRO must suspend the ~~producer's Plant's~~ quality control QC plan. Actions to be taken are related to the severity of the ~~producer's Plant's~~ unsatisfactory quality control QC and include the following three levels with their definition and corresponding action:

Level 1: Defect ~~r~~ Rate ~~l~~ Limit exceeded during one monitoring period

Definition: The ~~producer's Plant's~~ defect rate has exceeded the limit for one monitoring period, but did not exceed the limit during the previous period.

Action Required: ~~The District Materials Office~~ DMRO must send a notice to the ~~producer Plant~~ and may ask for a plan to reduce the defect rate in the form of amendment to the ~~quality control~~ QC plan.

Level 2: Defect ~~r~~ Rate ~~l~~ Limit exceeded for consecutive monitoring periods

Definition: The ~~Plant producer's~~ defect rate has exceeded the limit for consecutive monitoring periods or for any 2 periods out of 4 consecutive periods.

Action Required: The ~~District Materials Office~~ DMRO must issue a defect rate warning letter notifying the ~~producer that the Plant~~ that they are out of compliance with ~~the Plant's their~~ quality control QC plan. ~~This will require the Plant to~~ immediately re-submittal of the QC plan ~~by the producer~~ which must address a method for reducing the defect rate to below the established defect rate limit. ~~In addition, the frequency of the~~ quality control QC, verification, and independent assurance inspection and testing must be increased for a period

not to exceed 6 months. The duration is at the discretion of the ~~District Materials and Research Engineer~~ DMRE and will be commensurate with the seriousness of ~~quality control~~ QC lapses. ~~The increased frequency of the quality control QC, verification, and independent assurance will~~ inspection will be reduced to normal when a revised ~~quality control~~ QC plan has been approved and the ~~District Materials Office~~ DMRO is confident that the revised ~~quality control~~ QC procedures will result in a defect rate below the established defect rate limit.

Level 3: Defect ~~r~~Rate ~~l~~Limit exceeded for three consecutive monitoring periods

Definition: ~~The Plantproducer's~~ defect rate has exceeded the limit for three consecutive monitoring periods or for any 3 periods out of 4 consecutive periods.

Action Required: ~~The District Materials Office~~DMRO will suspend the Plant's QC plan and ~~must~~ notify the ~~producer Plant~~ that their ~~Plant's quality control~~QC plan has been suspended ~~until such time as the District Materials and Research Engineer~~DMRE determines that improved ~~quality control~~QC procedures will result in defect rates that can be sustained below the established defect rate limit for an extended period of time. During the suspension period, the Plant will not be permitted to produce any products for the product group in question. Rescinding the suspension will also require approval of a revised ~~quality control~~QC plan along with increased rates of ~~quality control~~QC, verification and independent assurance for duration to be determined by the ~~District Materials and Research Engineer~~DMRE. ~~If the Plantproducer~~ disagrees with the duration or imposition of the suspension, ~~an~~ appeal may be made to the Director, State Materials Office and suspension must not be imposed until the appeal process is complete. The ~~District Materials and Research Engineer~~DMRE may waive the suspension of the Plant's ~~quality control~~QC plan with approval of both the Director, Office of Construction and ~~the~~ Director, State Materials Office, when production of components for the group in question, and for a specific project, is critical for that project's ~~on~~time completion.

At the discretion of the DMRE, the actions required by the DMRO for a Plant exceeding the defect rate limit may be waived if the defect rate limit for a single category of product as specified in 8.3.7 is exceeded as the result of one major product defect in that category. This exception would also be permitted if the total number of products in a category, as specified in 8.3.7, is less than 20.

Commented [FT3]: It was requested by one of the Districts to allow actions to be waived if the defect limit was exceeded as a result of *one* major defect in a small number of products produced. Consensus was established to make the change in the October 2017 prestressed group meeting at SMO.

TABLE 8-3-1
PS PRESTRESSED CONCRETE PRODUCT DEFECT DATA TABLE

NUMBER OF PS CONCRETE PRODUCTS WITH MAJOR DEFECTS FOR THE 6 MONTH PERIOD -- TO -- PLANT NO.														
Product Category	Category Group	Product Name	Total Product Produced	Number of Defects by Type *									Total Defective	% Defective
				1	2	3	4	5	6	7	8	9***		
(1) P I L E S	Group 1A	14" sq. Piles												
		18" sq. Piles												
		20" sq. Piles												
		24" sq. Piles												
		30" sq. Piles												
	Group 1A Totals →													
	GP 1B	30" Voided												
	GP 1C	Sheet Piles												
(2) B E A M S	Group 2A	AASHTO-II												
		AASHTO-III												
		AASHTO-IV												
	Group 2A Totals →													
	Group 2B	AASHTO-V												
		AASHTO-VI												
	Group 2B Totals →													
	Group 2C	72 Bulb-T												
		78 Bulb-T												
	Group 2C Totals →													
	Group 2D	U-Beam												
	Group 2E	Other Beams												
(3) Slabs	Group 3A	PS Slab												
	Group 3B	PS + PT Slab												
(4)	Specification Violations**													

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NUMBER OF PRESTRESSED CONCRETE PRODUCTS WITH MAJOR DEFECTS FOR THE 6 MONTH PERIOD											THRU		Plant No	
Product Category	Category Group	Product Name	Total Product Produced	1	2	3	4	5	6	7	8	9**	Total Defective	% Defective
(1) PILES	Group 1A	14" sq. Piles												
		18" sq. Piles												
		20" sq. Piles												
		24" sq. Piles												
		30" sq. Piles												
	Group 1A Totals													
	GP 1B	30"/36" Voided												
GP 1C	Sheet Piles													
GP 1D	Cylinder Piles													
Category (1) Products Cast Total													Category (1) Defects Total	
(2) BEAMS	Group 2A	AASHTO II												
		AASHTO III												
		AASHTO IV												
	Group 2A Totals													
	Group 2B	AASHTO V												
		AASHTO VI												
	Group 2B Totals													
	Group 2C	72 Bulb-T												
		78 Bulb-T												
	Group 2C Totals													
	Group 2D	U Beams												
	Group 2E I Beams	36" FIB												
		45" FIB												
		54" FIB												
		63" FIB												
72" FIB														
78" FIB														
84" FIB														
96" FIB														
Group 2E Totals														
Group 2F	Other Beams***													
Category (2) Products Cast Total													Category (2) Defects Total	
(3) SLABS	Group 3A	PS Slab												
	Group 3B	PS + PT Slab												
Category (3) Products Cast Total													Category (3) Defects Total	
Totals	Total Products Cast/Defective													
(4) SPECIFICATION VIOLATIONS****														

*Defective Types: 1 - Spalls, 2 - Chips, 3 - Honeycomb, 4 - Cracks, 5 - Dimensional Deviations, 6 - Bearings
7- Reinforcement Errors, 8 - Materials Defect, 9 - Other Defective

** (9 Other Defective) Attach a Description of the Defective Type(s)

*** (Group 2F Other Beams) Attach a Description of the Type(s) of Beam(s)

**** (4 Specification Violations) Attach a Description of the Specification Violation(s)

* Defect Types: 1 —

Spalls, 2 — Chips, 3 — Honeycomb, 4 — Cracks, 5 — Dimensional Deviations, 6 — Bearings,
7 — Reinforcement Errors, 8 — Materials Defect, 9 — Other Defects

** Attach a Description of the Specification Violation

***Attach a Description of the Type Defect

TABLE 8-3-2
 PRESTRESSED CONCRETE PRODUCT DEFECT DATA SUMMARY TABLE

PS CONCRETE PRODUCT DEFECT DATA SUMMARY TABLE – 6 Month Period from _____ to _____																
CATEGORY	G R O U P *	DISTRICT 1 & 7			DISTRICT 2			DISTRICT 3			DISTRICT 4 & 6			DISTRICT 5		
		Total Produced	Total Defective	Defect Rate	Total Produced	Total Defective	Defect Rate	Total Produced	Total Defective	Defect Rate	Total Produced	Total Defective	Defect Rate	Total Produced	Total Defective	Defect Rate
1 PILES	A															
	B															
	C															
2 BEAMS	A															
	B															
	C															
	D															
	E															
3 SLABS	A															
	B															

PRESTRESSED CONCRETE PRODUCTS MAJOR DEFECT DATA SUMMARY TABLE - 6 Month Period													thru			
CATEGORY	GROUP	DISTRICT 1 & 7			DISTRICT 2			DISTRICT 3			DISTRICT 4 & 6			DISTRICT 5		
		Total Produced	Total Defective	Defect Rate	Total Produced	Total Defective	Defect Rate	Total Produced	Total Defective	Defect Rate	Total Produced	Total Defective	Defect Rate	Total Produced	Total Defective	Defect Rate
1 PILES	A															
	B															
	C															
	D															
CATEGORY TOTALS																
2 BEAMS	A															
	B															
	C															
	D															
	E															
	F															
CATEGORY TOTALS																
3 SLABS	A															
	B															
CATEGORY TOTALS																

* 1A - Square Piles (inches square): 14, 18, 20, 24, and 30

1B - Square Piles (inches square): 30 & 36 Voided

1C - Sheet Piles: all sizes

1D - Cylinder Piles

2A - AASHTO Beams: Type II, III, IV

2B - AASHTO Beams: Type V and VI

2C - Bulb-T Beams: 72" and 78"

2D - Florida U Beams (FUB)

2E - Florida I Beams (FIB)

2F - All Other Types of Beams

3A - Prestressed Slabs

3B - Prestressed and Post-tensioned Slab

1A — Square Piles (inches square): 14, 18, 20, 24 and 30

1B — Square Piles (inches square): 30 Voided

1C — Sheet Piles: all sizes

2A — AASHTO Beams: Type II, III and IV

2B — AASHTO Beams: Type V and VI

2C — Bulb-T Beams: 72" and 78"

2D — Florida U Beams (FUB)

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~~2E—All Other Types of Beams~~

~~3A—Prestressed Slabs~~

~~3B—Prestressed and Post-tensioned Slab~~